CLUSTER LIFE CYCLES: TYPES AND DRIVING FACTORS

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ABSTRACT
This paper presents a thorough theoretical scientific analysis on cluster life cycles and highlights in detail the main structuring of the life-cycle types. Moreover, based on the provided example of the maritime industry cluster conditions, the author presents a deductive analysis of the entire cluster life cycle distinguishing the main local and global driving factors. Using scientific literature analysis and synthesis, systemization, as well as deduction there are outlined the emergence and evolution of the key cluster driving forces. Finally, the paper provides the most important findings on the cluster life cycle conditions that have impact on the cluster development processes.
KEYWORDS: *cluster, life cycle, driving factor.*

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Introduction

Most of the existing scientific literature, at the theoretical as well as the empirical level, focuses on understanding and outlining the creation, existence and functioning of contemporary successful clusters in various industries.

Research problem. Economic advantages that stem from cluster dynamics are not long lasting (Grabher, 1993), therefore, the main factors explaining the present creation and functioning of a cluster may not explain its evolution entirely. An important and highly discussed question in economics is how to explain the dynamics of industrial clusters, i.e., their emergence and evolution through time. The few existing theoretical insights on the emergence of clusters, for example, lead to the doubtful conclusion that the processes responsible for the functioning of a cluster cannot explain its emergence (Bresnahan et al., 2001; Orsenigo, 2001). Also, the decline of clusters seems to be caused by various multifunctional factors that were advantages in the past period, but are not anymore contemporary (Jacobs, 1969; Martin, Sunley, 2006; Maskell, Kebir, 2005). This leads to awareness that cluster theory remains incomplete and possibly misleading in the absence of life-cycle structuring considerations. Some foreign scientists have recently highlighted the need to understand when, how and why clusters initiatives become clusters, and how they develop through the entire process, as well as the main reasoning for decline (Feldman, 2001; Feldman et al., 2005). Thus, the object chosen for this theoretical research paper is the cluster life cycles.

As there is a clear and direct link between clusters' performance and regional economic evolution (Boschma, 2007; Martin, 2009; Martin, Sunley, 2006, Elola et al., 2010), the aim of this article is to analyse a new area in the process of long-term economic development based on an overview of the main industrial cluster life cycles in the EU region, evaluating the role of path-dependent and past-dependent forces in their

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growth trends. Following the set aim, there were distinguished the necessary tasks: firstly, following quantitative and qualitative indicators (cluster and industry life cycle and cluster diversity), to identify cluster life cycles and development stages of each cluster; secondly, to analyse the factors that account for the origin, development, maturity and decline or renewal of a cluster, considering factors, which are related to both cluster dynamics and the regional environment, and also using local as well as global factors structuring.

The main research methods used in the paper: scientific literature analysis and synthesis, systemization, deduction, conclusions.

This paper is divided into three parts. The first one discusses the literature on cluster life cycles and sources of path and past dependency. The second one presents a picture of the main factors, that affect clusters today and analyses their evolution, discussing and evaluating the driving factors at each stage. Finally, the paper presents the main structured and outlined local and global factors investigating a case study on the chosen maritime industry field. Finally, there are given some preliminary conclusions of the paper.

1. Types of cluster life cycles

While one part of cluster theory is path dependency, the theory and some implications provided in this article show that clusters go through stages of comparative success trend and then decline, thus some of them are more mature than the others. This chapter provides implications on to which extent business development cycle and growth theory add to business the clear outlines of cluster performance. Business development cycles are advances and declines in the accumulated economic field, which seems doubtful that they are not defined by any single pattern, though they are flexible and persistent. As it is noted by scientists, growth rate cycle downturns are pronounced, pervasive and persistent declines in the growth rate of aggregate economic activity (Bry, Boschan, 1971).

The economic literature outlines several types of cluster cycles: the inventory or Kitchin cycle (3–5 years); the investment or Juglar cycle (7–11 years); the building or Kuznets cycle (15–25 years) and the most known the long wave or Kondratieff cycle (45–60 years), which were named accordingly, after their discoverers. J. van Duijn (1983) outlines more the fast innovations investment cycle to the business cycle concept and these cycles are relevant by their turning points in innovations investment. At this issue the case of business cycles, the dates of the troughs in the growth rates of output, income, employment and sales, and the peaks tend to reinforce, demonstrating the cyclical co-movement and ongoing management issues related to each of them.

The S-shaped curve by the French sociologist Gabriel Tarde in 1890 was firstly presented as a concept of the growth (van Duijn, 1983). G. Tarde patterns outlined the main patterns how growth at the concept or invention stage, once initial barriers are overcome, will be developed rapidly until it becomes sustained. The growth stage will decrease and might even become negative, if the original novelty is replaced by another one.

M. P. Menzel and D. Fornahl (2010) suggest a knowledge-driven clusters life cycle theory, summarized in Figure 1. Namely, two main elements of the cluster structure are considered: the number of employees and the heterogeneity of "accessible knowledge". The main driver of the cluster life cycle, addressed in terms of the number of employees, is a gradual process of knowledge homogenization among the members of a cluster. Like D. B. Audretsch and M. P. Feldman approach (1996), by the role it attributes to the nature of knowledge in the dynamics of a cluster, this theory has the advantage to avoid too deterministic evolution from emergence to death, since clusters can always enter into loops of self-sustainment, successive cycles of growth and decline, or even re-orient themselves through a process of "transformation" (Desmarchelier et al., 2015). This adaptability is determined by the degree of knowledge heterogeneity and the openness to newcomers of incumbent firms' networks.

Growth rate cycles, like business cycles, are identified for each country in the same way. The only major difference is that business cycles refer to alternating periods of expansion and contraction, while the growth rate cycles refer to alternating periods of growing and declining in industry. The S-shaped growth curve developed in the field of marketing, where it became known as the product life cycle, was invented by Joel Dean in 1950 (Van Duijn, 1983) and currently there are four and five stage models found in the product life

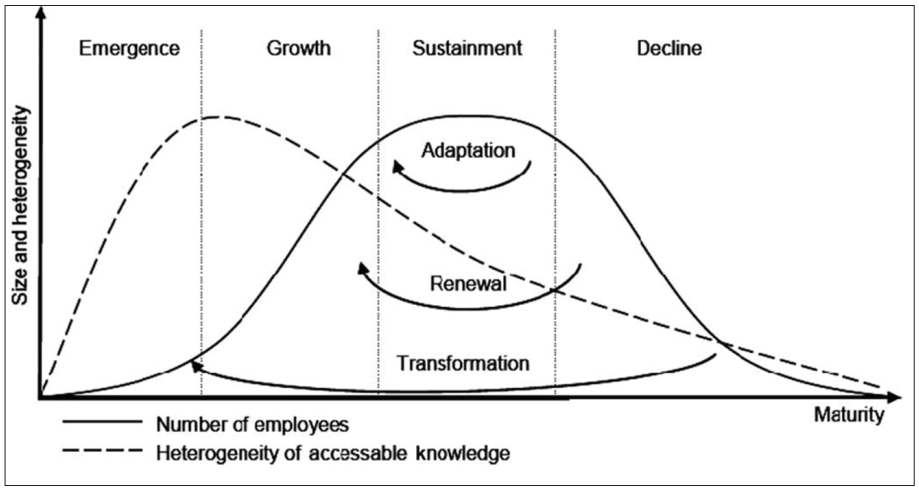

Fig. 1. Knowledge-based cluster life cycle

Source: M. P. Menzel and D. Fornahl (2010: 218).

cycling. The S-shape curve is also used in the technology literature, where the S-shape corresponds to individual technologies and the sequence of new technologies. Another area where the S-shaped cycle is found contributes to the theory of international trade, developed by the Vernon school (1966, cited in van Duijn, 1983) where Net Export and Net Import defines 5 stages to the internationalization. Here, the consequences of the life cycle of a product in relation to the national and international development of industries and companies are considered.

S. Kuznets (1930) noted that long-term national economic development is reinforced by the succession of leading industries. Rapid growth in industry at the stages of business growth will not continue indefinitely and ultimately decrease in its evolution and, eventually, will be overtaken by another industry. Is there then a life cycle in the cluster, i.e., does there exist a critical mass when the actors no longer take advantage of clustering in a regional or national context and start to leave? R. Pouder and C. H. St. John (1996) suggest that the agglomeration economy, which initially unites firms into clusters, may eventually collapse. R. Martin and P. Sunley (2002) believe that this is perhaps the first documented theory of the life cycle in clusters, where the formation, growth and reduction of clusters are against the backdrop of the industry's life cycle.

The competitiveness of firms in clusters due to their synergies, innovations and strategies over time converge with firms that are not grouped. This may be due to the limited collective behavior of clustered firms, as they determine their own competition due to the emergence of competitive "blind spots" that limit their innovation, strategic positioning to the extent of reducing their ability to respond to system-wide shock, for example, changes in government policy. On the other hand, non-clustered firms tend to be less limited and more adaptable to sudden changes throughout the whole economy.

It is assumed that the cluster network of interdependent firms is a source of competitive advantage in the early stages of cluster formation and growth, creating inertia and inflexibility for firms in the cluster (Pouder, St. John, 1996). M. E. Porter (2000) acknowledges that participation in an established cluster does not always help a firm to adapt to new circumstances. When a cluster shares a common approach to competition, a kind of group thinking often reinforces the old behavior, gives new ideas and creates obstacles and major risks that prevent the adoption of improvements. Clusters also may not support truly radical innovations, which are usually invalid for existing pools of talent, information, suppliers and infrastructure. In these circumstances, a cluster member may face greater obstacles to perceiving the need for change (Porter, 2000: 24).

Some other scientists (Swann, Prevezer, 1998) assume that clusters have a life cycle, related to the life cycle of the technologies developed. This means that "the growth and entry of new firms is depended not only on the life cycle of technologies, but also on the life cycle of the cluster". Each industry contains several technologies, if new technology is introduced and the old become useless, there will be major changes in the industry. If the new technology for some reason is excluded from a cluster, it could have major implications for the cluster's competitiveness. The level of technology relates directly to the health of the hi-tech cluster in that the cluster with diversified technology survives better than the single technology cluster.

G. M. P. Swann et al. (1998) describes three stages of a cluster life cycle. One of them is the critical mass or take off stage where the number of new entries starts increasing and the cluster grows in size. The growth plateaus at the peak of the entry stage; and more or less stops growing at the saturation stage. The level of entries is linked to the change in technology and congestion on either the demand or supply side also causes the cluster to mature. Thus, it is necessary to overview the main driving forces that affect the emergence and evolution trends of clusters.

2. Factors driving cluster emergence and evolution

Based on the existing scientific literature (e.g., Belussi, Sedita, 2009; Brenner, Miihlig, 2007), the paper outlines which factors may influence both the emergence and the evolution of clusters. On the one hand, in both cases, the factors that are endogenous to a cluster and/or the territory where this cluster is located are called "local factors". On the other hand, as internationalization processes affect the emergence and the evolution of clusters, so they are also regarded as one of the most difficult challenges for clusters (Belussi, Sedita, 2009), therefore, it is considered that the influence of "global factors" is detected on both the emergence and the evolution of clusters (see Table 1).

Table 1. Driving factors of clusters' life cycles

	Life cycle stages	
	Cluster emergence	**Cluster evolution**
Local factors	Tradition and historical preconditions Factor endowment Anchor firms and entrepreneurship Local demand Local and national policies	Development of factors specific to the cluster Strategic capabilities Local sophisticated demand Local and national policies
Global factors	Entrepreneurship and foreign investment Inflow of external knowledge and technology	Entrepreneurship and foreign investment Inflow of external knowledge and technology Global competition International demand growth

Source: A. Elola et al. (2012: 259).

Cluster emergence factors. Prior existence of similar activities, supplier industries, related industries or entire related clusters may also ease the establishment of a new cluster in a region (e.g., Boschma, Wenting, 2007; Brenner, Miihlig, 2007; Porter, 1998). Pre-existing community values such as attitudes towards entrepreneurship, cooperation or innovation are relevant for local clusters. In some cases, existing social institutions and/or networks of well-connected actors can be important for the emergence of a local cluster (Brenner, Miihlig, 2007). It is necessary to include all those factors that are given in a region because of its geographical location, such as the presence of natural resources, and other relevant factors, such as availability of qualified labour, transportation infrastructure, local capital market and financial institutions, the existence of a leading research university, technology and science parks, business incubators, some associations initiatives, etc. (Belussi, Sedita, 2009; Brenner, Miihlig, 2007), that may also be crucial for the development

of a cluster in a specific geographical region. The foundation of one or two successful innovative companies might also be the starting point for the emergence of a local cluster (Belussi, Sedita, 2009; Brenner, Miihlig, 2007; Bresnahan et al., 2001; Feldman et al., 2005). Thus, local entrepreneurship and specific innovations may be crucial for the emergence of a cluster. At the cluster emergence stage, the existence of local demand is usually strongly related to tradition and historical preconditions (as it comes from sectors and industries that already exist), but scholars opted to consider it separately. Government policies may also be important for the birth of a cluster (Brenner, Miihlig, 2007; Porter, 1998, Elola et al., 2012), ad two kinds of policies can be distinguished here. On the one hand, there are policies that were in place before the emergence of a local cluster and indirectly influenced its emergence. On the other hand, there are policies that explicitly try to trigger the emergence of a local cluster. These last types of policies, popular in recent years, contributed to the emergence of some clusters. However, in the literature, the possibility to create local clusters driven by political initiative is seen as being very limited (Brenner, Miihlig, 2007), although it is recognised that some policy measures are helpful in the evolution of the cluster. Following some scientists' ideas (Belussi, Sedita, 2009), it is reasonable to consider that globalisation may play an important role in the emergence of clusters. Namely, the entry of an external dynamic firm (a multinational company (MNC) or a subsidiary) with both foreign investment and foreign entrepreneurship, and the inflow of external knowledge and technology may act as triggering factors for the emergence of a cluster.

Factors driving cluster evolution. Among the local factors, it is important to distinguish one category directly related to the cluster's legacy, i.e., development of factors specific to a cluster. Another category of factors is related to the strategic capabilities developed by cluster firms, whereas two more categories refer to other regional agents, i.e., local sophisticated demand and local/national policies. Therefore, it is necessary to introduce each of these categories. The accumulation of highly specialized human capital may be an important driving factor of cluster development (Brenner, Miihlig, 2007). Technological innovation is a typical way in which firms can upgrade and enhance the clusters' industrial base. This process often involves not only the individual firm, but also a system of actors under an open innovation perspective (Chesbrough, 2003), where a crucial role is played by universities and public research organizations (R&D). One particularly important factor is the accumulation of social capital, that is, the efficacy of formal and informal mechanisms (i.e., social networks) for bringing cluster participants together and facilitating mutual acquaintance, development of trust relations, collaboration, and dissemination and exchange of information (Brenner, Miihlig, 2007; Feldman et al., 2005, Elola et al., 2012). These include proactive performance of the cluster association, social networks of college graduates and researchers, a high mobility of qualified human capital and ties between firms (within a cluster and related sectors), universities and technological centres, clients (regional and national) and governmental institutions, developing a dynamic of collective learning and continuous innovation (Brenner, Miihlig, 2007; Capello, Faggian, 2005). Companies' routines and capabilities are highly idiosyncratic and constitute one of the sources of competitive advantage. Under this category, it is needed to distinguish two types of capabilities: strategic capabilities in the restricted mode-oriented and dynamic capabilities. The first one is related to the competitive strategies that cluster firms may follow, such as cost leadership, or diversification and differentiation strategies. Cost leadership is a strongly path-dependent strategy and often leads to lock-in trajectories. This strategy is myopic and firms or clusters adopting it risk being stuck in a perverse spiral of cost reduction, which does not provide any relevant resources to face global competition from low-cost countries. Diversification, differentiation and product upgrading strategies (through innovation), on their hand, may be an important mechanism of "de-locking", which increase the local capabilities and find the way to new development and growth trajectories (Belussi, Sedita, 2009). Dynamic capabilities constitute the firm's ability to face up rapid changes in the environment and to modify its existing capabilities. One type of dynamic capability is the absorptive capacity, the capacity to absorb, diffuse and creatively exploit external knowledge. Absorptive capacities can be observed both at the firm and at the cluster level and constitute one of the main factors of the cluster competitive advantage (Giuliani, 2005; Ter Wal, Boschma, 2009; Elola et al., 2012).

It also requires a greater collaboration and interaction between producers and their clients, contributing to the formation of social capital in a cluster. To conclude, the appearance of a group of sophisticated and

technically demanding customers does clearly have a direct and positive effect on the resources and capabilities of the clustered firms. Policy-makers also react to developments in the region, such as the emergence of a local cluster, and attempt to support them by using various schemes. The main role of local and national policies during the evolution of a cluster may be to create a favourable environment for cluster development, supporting new business formation, qualification of labour force, fostering cooperation, etc. According to J. Potter and G. Miranda (2009), the fundamental rationale for policy intervention in clusters is to facilitate the exploitation by firms and workers of potential local external economic benefits from input-output linkages and knowledge spillovers as well as increase productivity and generate growth. Following these authors, there are two ways in which cluster policy can facilitate the exploitation of positive externalities: stimulating growth in cluster mass and encouraging collaboration among cluster agents. In most of the cluster policies, this has been done through the generation of cluster associations. The globalisation process generates flows of commodities, capital, information and knowledge, and it takes the form of internationalization, entry of multinational companies or relocation processes, which affect the evolution of clusters (Belussi, Sedita, 2009). In this context of globalisation, the absorption of extra-cluster knowledge and the interaction between the system of intra- and extra-cluster knowledge are of particular importance for securing a cluster competitive advantage and preventing the isolation of clusters or myopia (Giuliani, 2005; Maskell, Malmberg, 2007). Leading cluster firms and cluster associations can act as technologic gatekeepers of extra-cluster knowledge that they direct to a cluster. In some cases, outside actors, such as representatives of multinational companies, can also stimulate the flow of external knowledge into a cluster.

3. Local and global factors: a case of maritime industry cluster life-cycle

The analysis of the information collected from scientific literature and case studies in the EU maritime regions allowed to identify the most significant factors behind the emergence and evolution of each cluster (Table 2 summarises the driving factors of each life cycle). From their origins, the evolution of analysed clusters is determined by a multiplicity of factors, rather than by a single one. So far, it can be assumed that a qualitative analysis does not allow to establish a single factor that accounts for the origin of each cluster, as R. Belussi and C. Sedita did in their sample on Italian industrial districts (Belussi, Sedita, 2009).

Cluster origin (emergence) is the initial stage where the basics and essential platform for a cluster are established. This stage is explained by a combination of local factors: demand, entrepreneurship and anchor firms, factor conditions, tradition and historical preconditions, plus local policies, together with the inflow of external knowledge and technology. The conclusions about the significance of local conditions and, in particular, local conditions of demand and factors, on the origin of clusters as a whole are consistent with the conclusions that C. van der Linde (2003) made based on a large sample of world clusters, although his classification strictly follows the Porter's model. Local demand played a key role in all the cases studied: it appeared from the manufacturer of game cards in the paper cluster at the end of the eighteenth century (and since the 1840s, since the final demand associated with regional economic development); from the merchant fleet and fishing fleet, the first and second largest fleets in Europe in the early twentieth century, respectively, in the maritime cluster; from multiple well-developed industrial sectors and from the electrical companies, in the electronics cluster in the 1940s and 1950s; and from a national demand in the aeronautics one (Elola et al., 2012). Regarding the factor conditions, with the exception of one case related to the physical potential of the region (accessibility of water for the paper industry), the rest were linked to the previous industrial route of the region, which led to the existence of a skilled workforce, local entrepreneurship and technical specialists from related sectors, and also hydraulic and transport infrastructure. As for the work of R. Belussi and C. Sedita (2009), they distinguish two factors: the traditions of ancient crafts and the anchor. In the analysed case studies, more important than the only anchoring firm is the availability of local entrepreneurship, often from related sectors and industries, which in turn is again linked to the long historical tradition in many industries (hence the importance of historical prerequisites appear). Local entrepreneurs created a pool of founding firms that played a driving role in the subsequent stages of cluster development, setting up a tech-

nological trajectory, shaping the cluster borders, promoting new firm creation by spin-off processes, and/or creating new institutions and organizations for the successful cluster development.

The main local and global driving factors that influence the cluster life-cycle, are provided below in Table 2.

Table 2. Driving factors of the maritime industry cluster life-cycle

Driving factor	Origins	Origins to development	Development to maturity	Maturity to decline and/or renewal
LF: Tradition and historical preconditions	Ancient craft tradition in shipbuilding that goes back to the twelfth century			
LF: Factor endowment	Concentration of the most important iron and steel works, metal industries Port infrastructure			
LF: Anchor firms and entrepreneurship	Creation of shipyards Creation of new firms Local entrepreneurship	New entrepreneurship creates small and medium shipyards		Local entrepreneurship buys former nationalized shipyards and creates new firms in the auxiliary industry
LF: Local demand	Large local demand from highly dynamic shipping and fishing fleets	Increasing local demand from highly dynamic shipping and fishing fleets	Increasing local/ national demand from highly dynamic shipping and fishing fleets	Decreasing national demand due to heavy crisis of shipping and fishing industries
LF: Local and national policies	Warships for shipbuilding Domestic traffic protected by tariffs	Reserved domestic market	Reserved domestic market Export subsidies Promotion of national champions	External openness and liberalization of the national market.
LF: Development of factors specific to the cluster		Development of an auxiliary industry (metal products, steam and diesel engines, pumps, etc.)	Appearance of naval engineering and naval consultancy firms Development of an auxiliary industry (electronics, machinery, etc.) Education centres Social capital: industry associations	Technology centres have developed specialized research units Social capital: associations, joint research projects, inter-firm cooperation
LF: Strategic capabilities		Lager shipyards: cost leadership and diversification Small and medium shipyards: diversification into several types of vessels	Lager shipyards: cost leadership, diversification and standardization (tankers and bulk carriers) Small and medium shipyards: diversification into several types of vessels Technological innovation in auxiliary industry	Product differentiation and diversification in niche markets and highly sophisticated vessels by the surviving shipyards Technological innovation and product differentiation in auxiliary industry

Driving factor	Origins	Origins to development	Development to maturity	Maturity to decline and/or renewal
GF: Inflow of external knowledge and technology	Hiring qualified labour and technicians Foreign technology imported	Import of foreign technology (licenses and patents)		
GF: International demand growth			Increasing exports to other European and American markets	Increasing exports Some auxiliary firms have started to set up commercial and manufacturing facilities abroad
GF: Global competition				Cut throat competition from East Asian shipyards
GF: Foreign investment and entrepreneurship				Joint ventures and spin-offs.

Source: modified according to A. Elola et al. (2012).

With regard to younger clusters that are more intensive in R&D and knowledge, cluster firms have built up a solid resource base and opportunities that allocate large amounts to R&D, following the strategy of technological innovation, product upgrading and differentiation, and sometimes diversification and the creation of larger business groups. This other strategy can also be explained by the fact that both clusters appeared and developed in an economy much more open to external competition than in two mature clusters. Accordingly, almost since their parent companies in both clusters had to increase their absorptive capacities, they complemented and developed the process of internationalization. It should be emphasized that firms that developed an absorbing capacity in two mature clusters were precisely those that are more dependent and/or related to the international market and external sources of knowledge: manufacturers of equipment for paper making of firms and shipyards, and small and medium shipyards.

Relating to the global factors, while the influx of external knowledge and technology are the two most important in the origin and development stages, global competition and the growth of international demand are playing an increasingly important role, no matter what phase is involved, something that R. Belussi and C. Sedita (2009) have also stressed for the Italian industrial areas. The answers differed according to the cluster considered: in the electronics and ICT and in the clusters of aeronautics, the companies strengthened their research and innovation capabilities, and they went to the international level, creating commercial and production facilities (even R&D) abroad and creating large and powerful business groups, which also occurred in the Italian industrial areas (Cainelli, 2009). In the paper and marine industries, only a small segment of clustered firms could survive and grow: the aforementioned small and medium shipyards and, in both clusters, manufacturers of goods and equipment solutions. In both clusters, these companies from related and supportive industries began developing their own products and solutions in the 1960s and 1970s to serve the local and national market and became world-class producers in the 1980s and 1990s (Valdaliso et al., 2008; 2010; Elola et al., 2012).

Factors such as local demand and factor conditions, as well as local entrepreneurship and the flow of external knowledge and technology, are the most important determinants of the origin or the origin of the studied clusters. The stage of cluster development is mainly conditioned by the existing mechanisms that depend on the path (the development of cluster-specific factors, the dynamic external economy of the Marshall-Arrow-Romer (MAR)-Porter-Jacobs) and the growing demand, whether local or international. However, since clusters evolve from development to maturity (or decline), it seems that the old local factors no longer provide sources of competitive advantages to firms and the cluster as a whole, and that both the firms and the

cluster must "invent" to make them different on the world market. At this stage, strategic capabilities at the firm and cluster level to create new competitive advantages, react quickly to changes (dynamic opportunities), and create global pipelines for other clusters and firms (absorbing capacity), seem decisive to overcome the blocking situations (Ter Wal, Boschma, 2009; Elola et al., 2012).

Though R. Belussi and C. Sedita (2009) have already put forward a proposal for the Italian regions, a theoretical analysis shows that the existence of a life cycle does not mean a direct path of growth. In some cases, the heterogeneity of growth patterns may be due to different initial conditions. However, despite similar initial conditions and/or resource stocks and opportunities for development, it is possible to note some heterogeneous evolutionary patterns. Clusters react differently to the same international demand and global competition and develop differently according to their learning opportunities (Belussi, Sedita, 2009). Thus, the evolution of a cluster cannot be solved only as a Marshall agglomeration economy, as it also depends on local specific training mechanisms and the introduction of technological innovations related to the importance of organizational, innovative products and processes.

Conclusions

Business cycles are advances and declines in aggregate economic activity, which cannot be defined not by any single variable, and are pervasive and persistent. The economic literature distinguishes the four main types of cluster cycles: the inventory or Kitchin cycle (3–5 years); the investment or Juglar cycle (7–11 years); the building or Kuznets cycle (15–25 years) and the most known the long wave or Kondratieff cycle (45–60 years) named after their discoverers. Like business cycles, growth rate cycles are identified in the same way for each country.

Each industry contains several technologies, if new technology is introduced and the old become useless, there will be major changes in industry. If the new technology for some reason is excluded from a cluster, it could have major implications on the cluster's competitiveness.

The factors that are endogenous to a cluster and/or the territory where the cluster is located, are called "local factors", such as: anchor firms and entrepreneurship, local demand, local and national policies, traditions and other related preconditions, factor endowment and development of factors specific to the cluster as well as strategic capabilities. On the other hand, as internationalization processes affect the emergence and evolution of clusters, so they are also regarded as one of the most difficult challenges for clusters, therefore, it is considered that the influence of "global factors" is detected on both the emergence and the evolution of clusters: foreign investment and entrepreneurship, inflow of external knowledge and technology, global competition and international demand growth.

Factors such as local demand and factor conditions, together with local entrepreneurship and inflow of external knowledge and technology are the most important determinants for the emergence of the studied clusters. Clusters react differently to the same international demand and global competition and evolve differently according to their learning capabilities. Thus, cluster evolution cannot be accommodated only within the role of agglomeration economies, but also depends on the local firm-specific of learning, technological innovation, stressing the importance of organizational, product and process innovations and successful cluster development from the origin to decline or renewal action plans.

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KLASTERIO GYVAVIMO CIKLAI: TIPAI IR SKATINAMIEJI VEIKSNIAI

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Santrauka

Straipsnyje analizuojami pagrindiniai klasterio gyvavimo ciklų tipai ir detaliai nagrinėjami juos formuojantys bei skatinantys globalūs ir lokalūs veiksniai jūrinio sektoriaus klasterio formavimo atveju. Apžvelgus mokslinę literatūrą, skiriami pagrindiniai klasterių plėtrai įtakos turintys veiksniai ir pagrindinės sėkmingo klasterio gyvavimo ciklo jūriniame sektoriuje prielaidos. Susisteminus pagrindinius klasterių gyvavimo ciklų tipus (išradimų, investicijų, gamybos / kūrimo ir žinių), šiame straipsnyje pristatoma atlikta klasterio gyvavimo ciklų teorinė analizė, išskiriami pagrindiniai vietiniai ir globalūs veiksniai, turintys įtakos klasterių susijungimui ir plėtrai, apibendrinami užsienio mokslininkų naudojamų klasterių susijungimo ir plėtros argumentai. Jūrinės pramonės klasterio gyvavimo ciklo analizės atveju straipsnyje detalizuojami pagrindiniai skatinamieji vietiniai ir globalūs veiksniai, identifikuoti kiekvienoje gyvavimo ciklo fazėje: formavimo, augimo, brandos ir smukimo / atsinaujinimo. Straipsnyje pagrindžiama nuostata, kad verslo gyvavimo, kaip ir plėtros, ciklai yra tiek pažangūs, tiek stabdantys bendrąsias ekonomines veiklas, jų negalima apibrėžti tik pagal vieną kintamąjį, nors jie yra gana plačiai paplitę ir nuolat kinta. Vietiniai veiksniai, veiksnių sąlygos, taip pat vietinė verslininkystė ir išorinių žinių įtaka bei technologijų sparta yra svarbiausi klasterių susijungimo jų gyvavimo cikluose veiksniai. Globalizacijos procesai, net jei jie priskiriami prie pagrindinių klasterių augimo ir brandos iššūkių, turi didžiulės įtakos klasterių plėtrai, tai: užsienio investicijos ir verslininkystė, išorinių žinių įtaka ir technologijos, globali konkurencija ir tarptautinės paklausos augimas. Klasterių gyvavimo ciklai kinta skirtingai, veikiami net tų pačių vietinių ir globalių skatinamųjų veiksnių, nes tam turi įtakos mokymosi gebėjimai, gerosios praktikos perėmimo ypatumai, lankstumas bei gebėjimas prisitaikyti prie besikeičiančių makroaplinkos veiksnių poveikio, taip pat konkrečių klasterį sudarančių įmonių imlumas žinioms, diegiamos technologinės inovacijos, skatinamos organizacinės, produkto ir procesų inovacijos bei strategiškai planuojama klasterio gyvavimo ciklo raida nuo jo formavimo iki pat smukimo su aiškiai suformuotu ir nuosekliai vykdomu tokios strategijos įgyvendinimo priemonių planu.

PAGRINDINIAI ŽODŽIAI: *klasteris, gyvavimo ciklas, skatinamieji veiksmai.*

JEL KLASIFIKACIJA: D21, D85, E32, F44

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